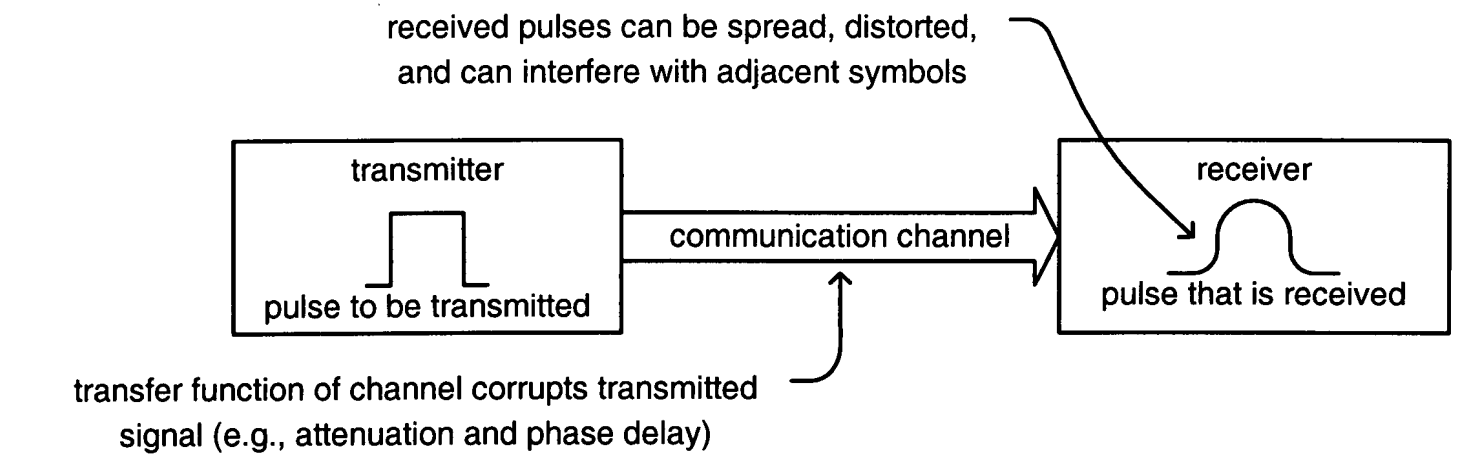
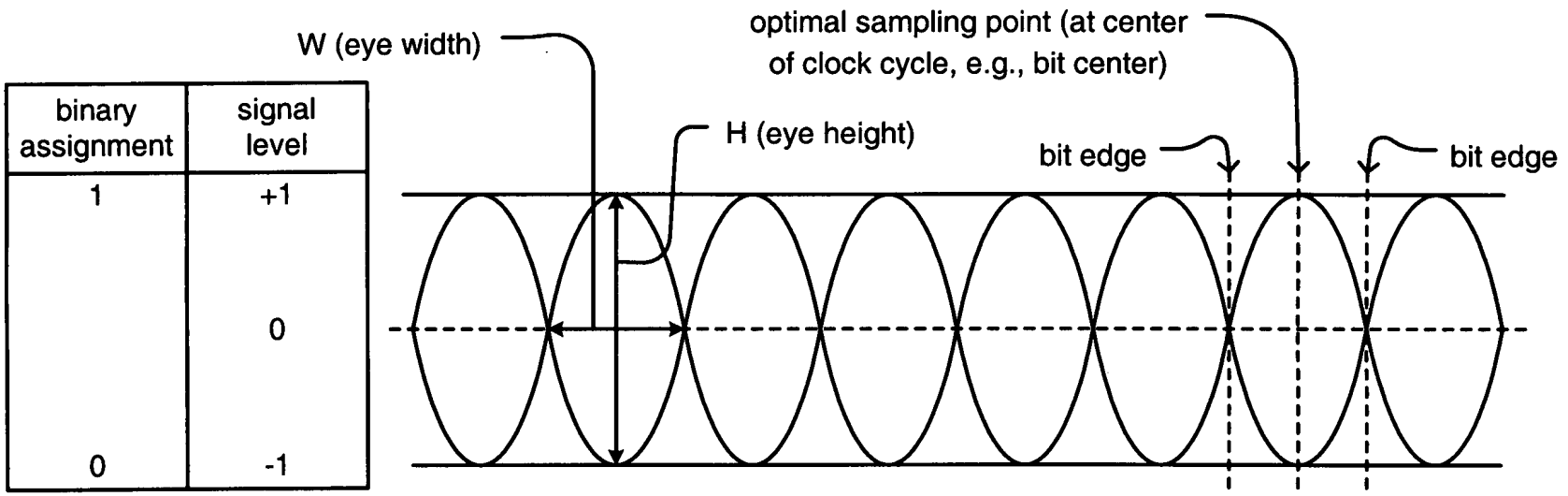


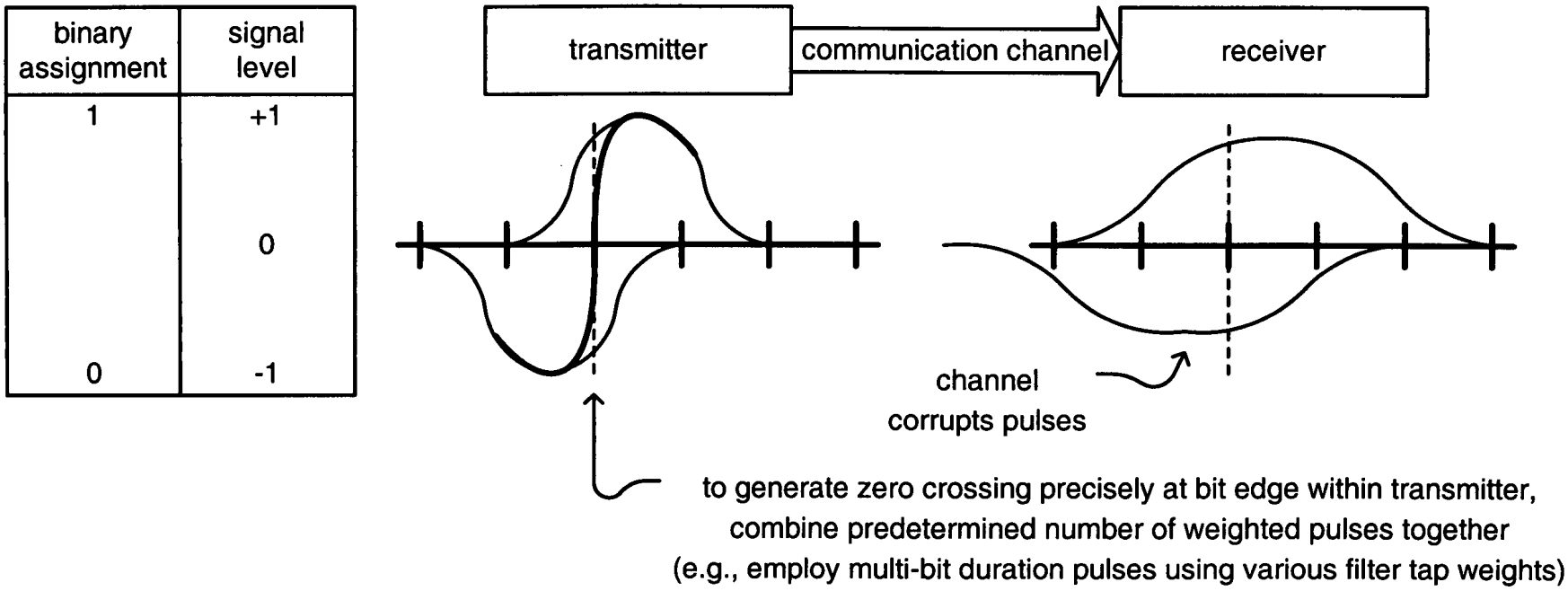
communication system (whose channel introduces undesirable ISI (Inter-Symbol Interference) to transmitted pulses)

Fig. 1A (prior art)



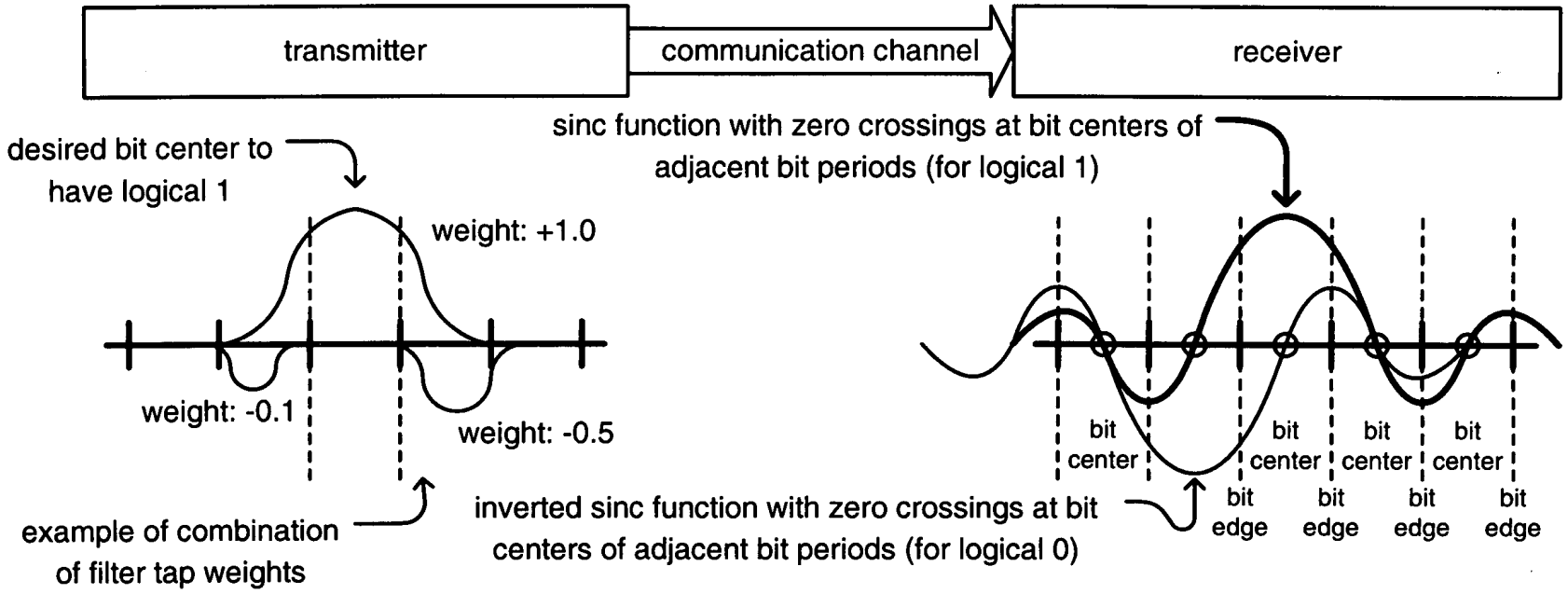
sequence of random data of an NRZ (Non-Return to Zero)/2 level signal

Fig. 1B (prior art)



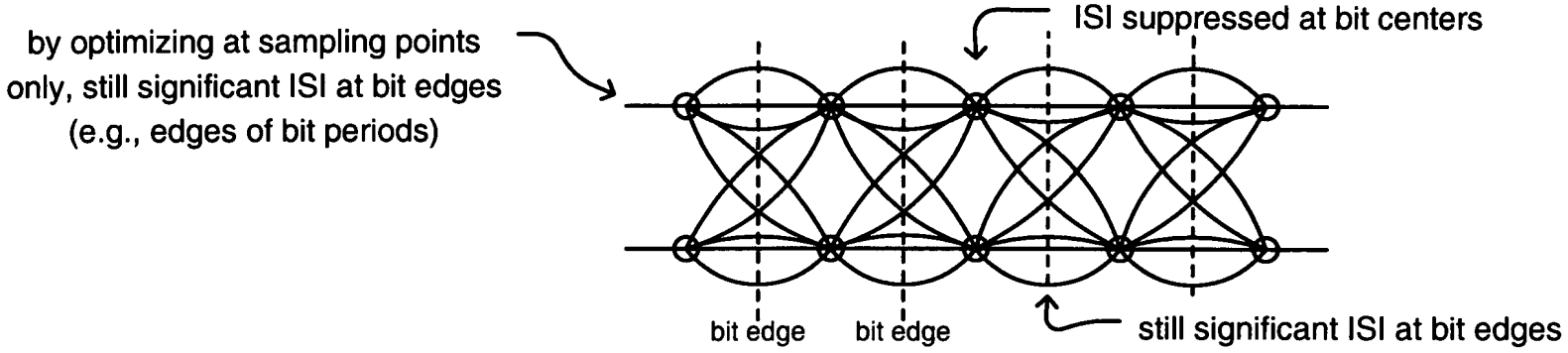
continuous time pulse response within a communication system

Fig. 2 (prior art)



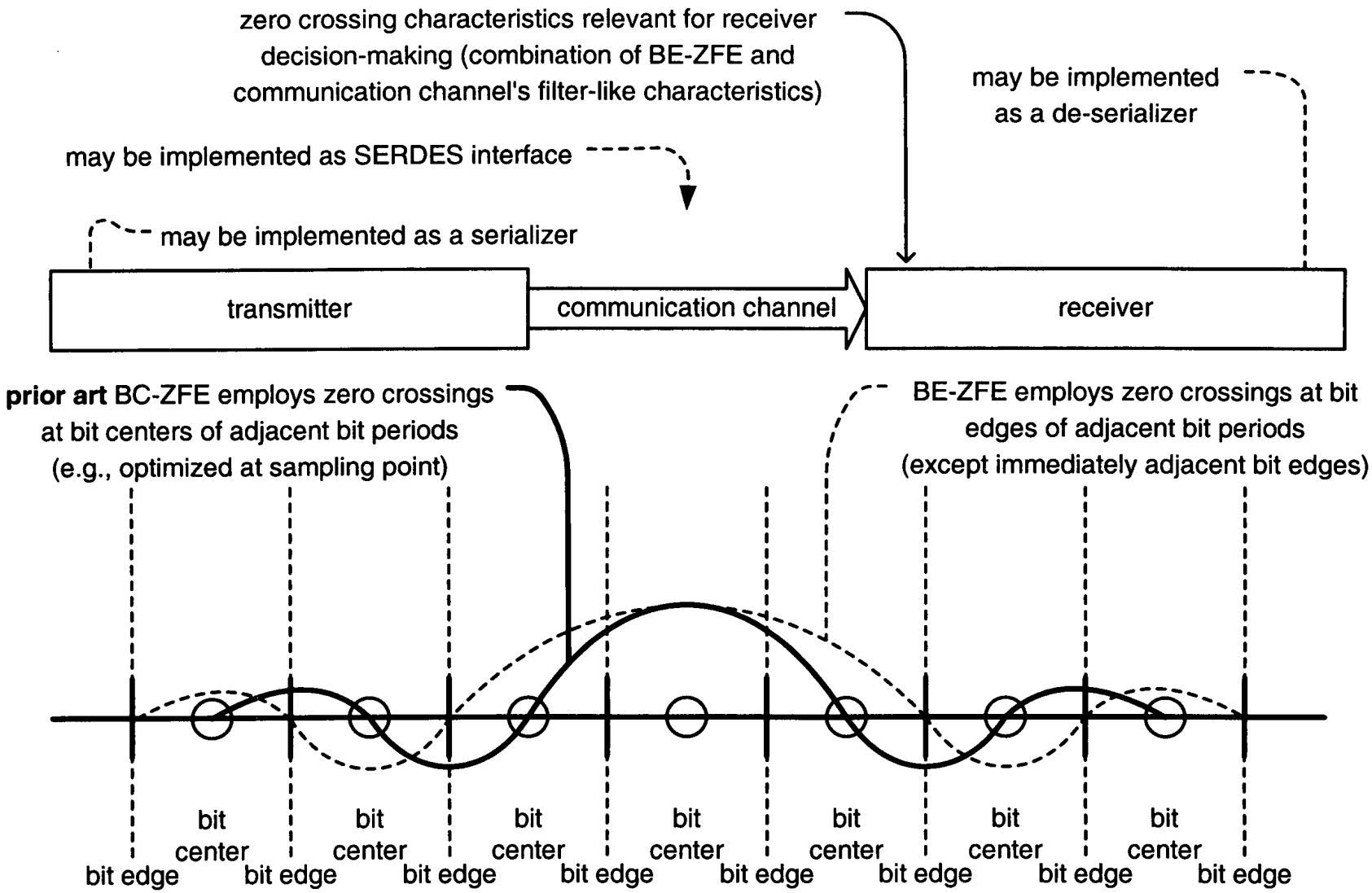
BC-ZFE (Bit-Center Zero Forcing Equalizer) signal shaping approach to send logical 1

Fig. 3A (prior art)



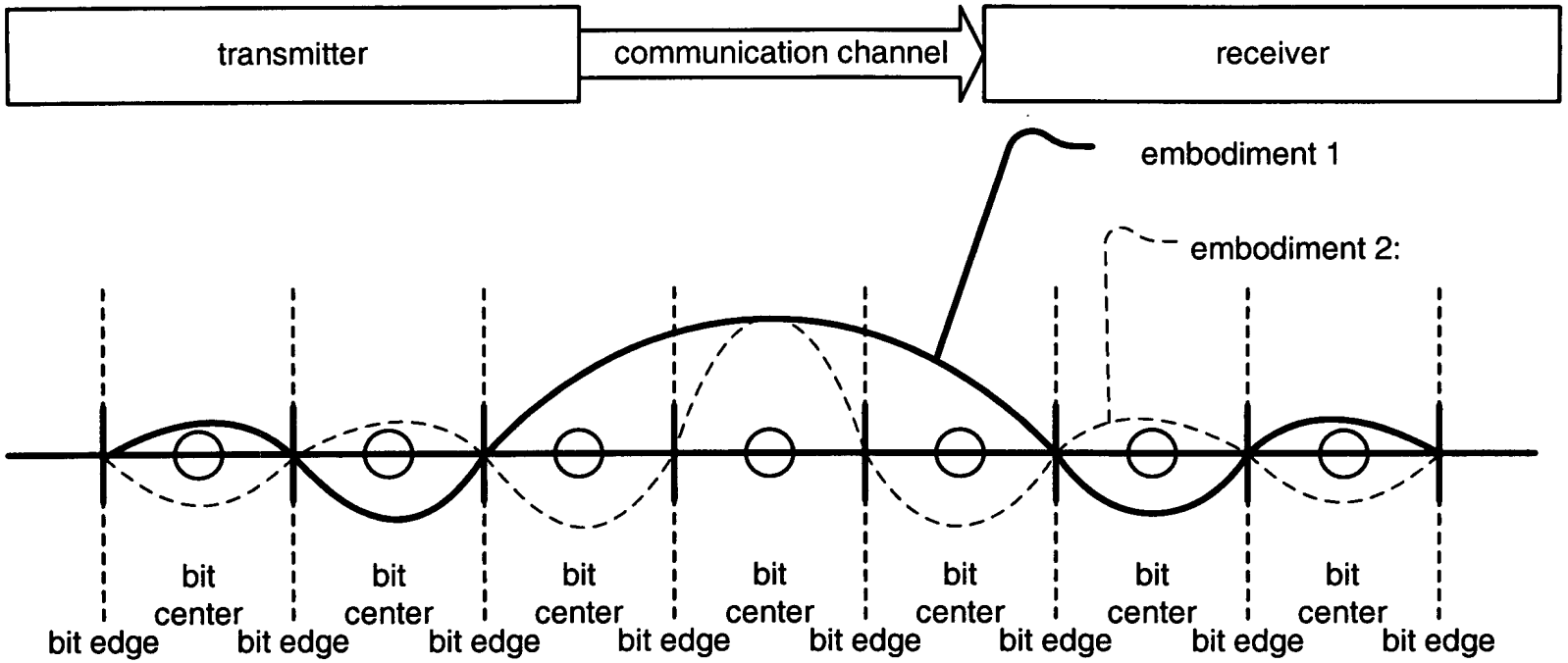
eye diagram of BC-ZFE signal shaping approach showing relative location of ISI

Fig. 3B (prior art)



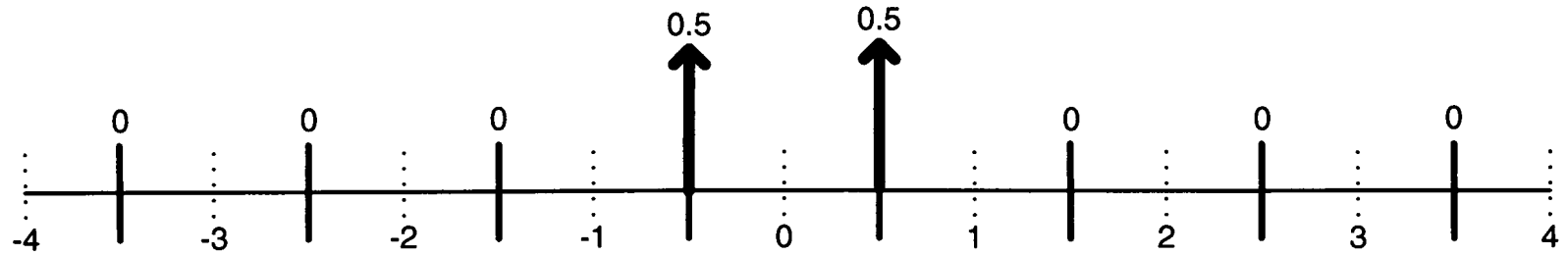
BE-ZFE (Bit-Edge Zero Forcing Equalizer) not including immediately adjacent bit edges

Fig. 4



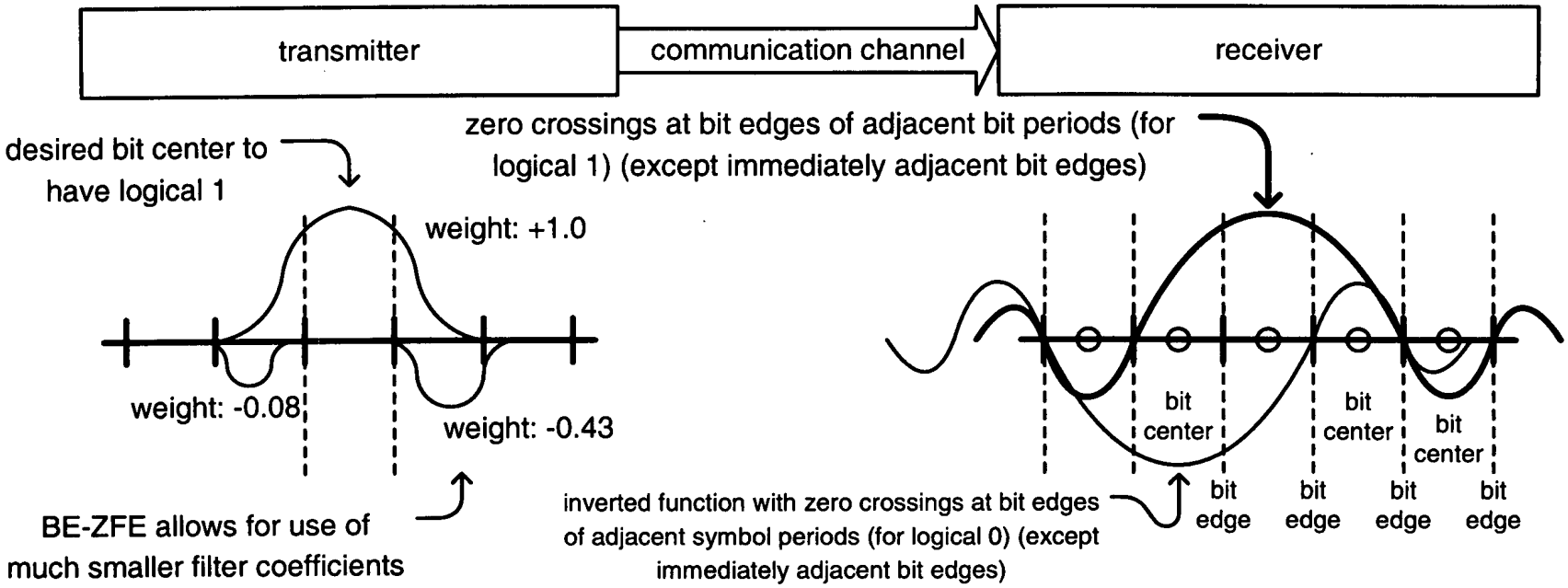
two possible embodiments BE-ZFE (Bit-Edge Zero Forcing Equalizer)

Fig. 5A



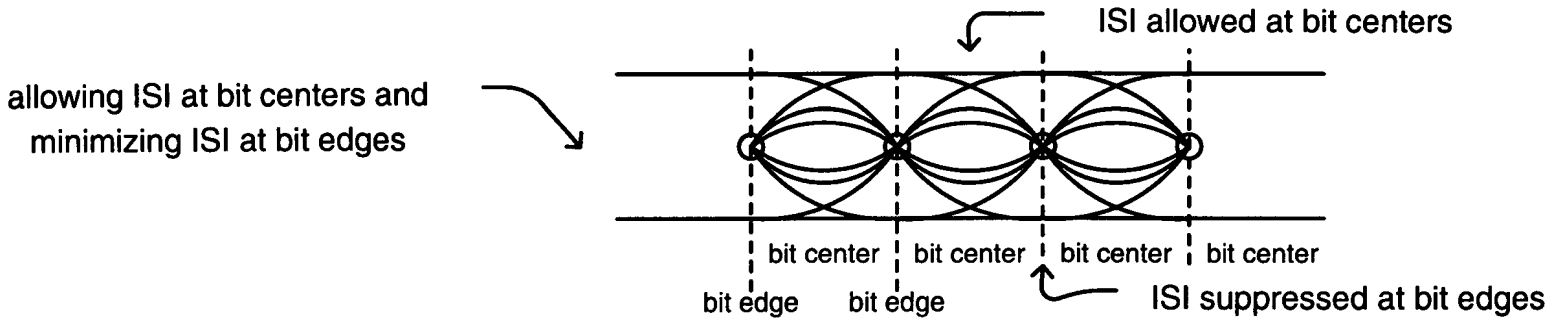
mapping of embodiment 1: BE-ZFE (takes pulse response values at bit edges and drives error to zero using mapping)

Fig. 5B



BE-ZFE (Bit-Edge Zero Forcing Equalizer) signal shaping approach to send logical 1

Fig. 6A



eye diagram of BE-ZFE signal shaping approach showing relative location of ISI (Inter-Symbol Interference)

Fig. 6B

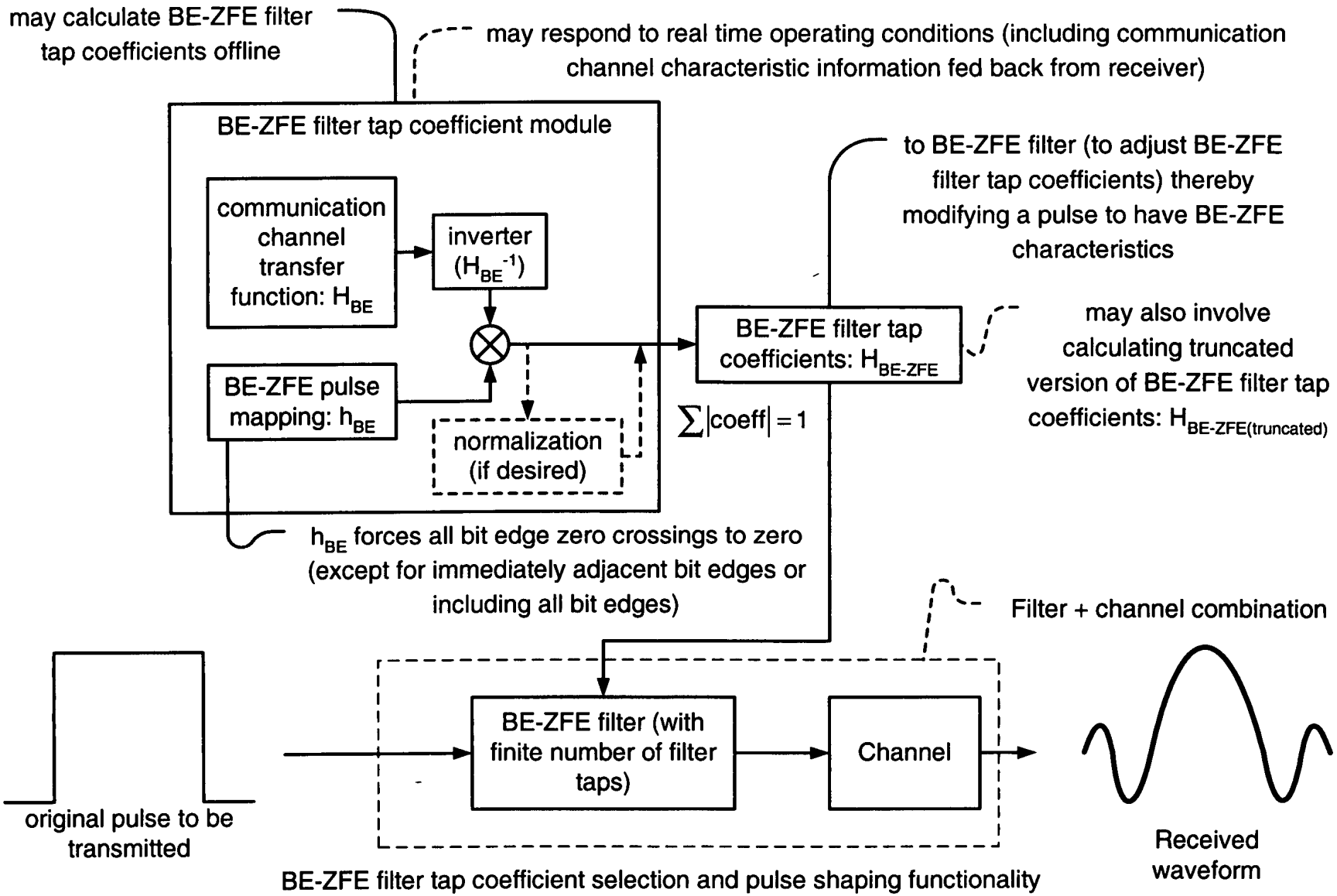
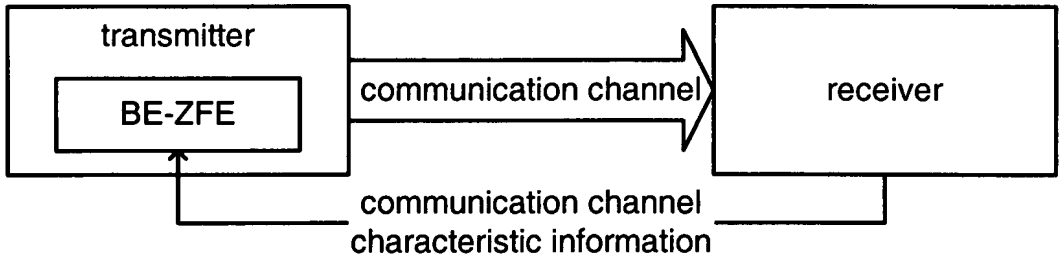
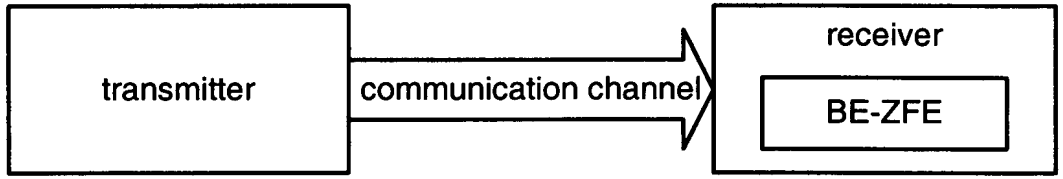

may calculate BE-ZFE filter tap coefficients offline
may respond to real time operating conditions (including communication channel characteristic information fed back from receiver)
BE-ZFE filter tap coefficient module
communication channel transfer function: H_{BE}
inverter (H_{BE}^{-1})
BE-ZFE pulse mapping: h_{BE}
normalization (if desired)
$\sum|coeff| = 1$
to BE-ZFE filter (to adjust BE-ZFE filter tap coefficients) thereby modifying a pulse to have BE-ZFE characteristics
BE-ZFE filter tap coefficients: $H_{BE\text{-}ZFE}$
may also involve calculating truncated version of BE-ZFE filter tap coefficients: $H_{BE\text{-}ZFE(truncated)}$
h_{BE} forces all bit edge zero crossings to zero (except for immediately adjacent bit edges or including all bit edges)
Filter + channel combination
BE-ZFE filter (with finite number of filter taps)
Channel
original pulse to be transmitted
Received waveform
BE-ZFE filter tap coefficient selection and pulse shaping functionality

Fig. 7



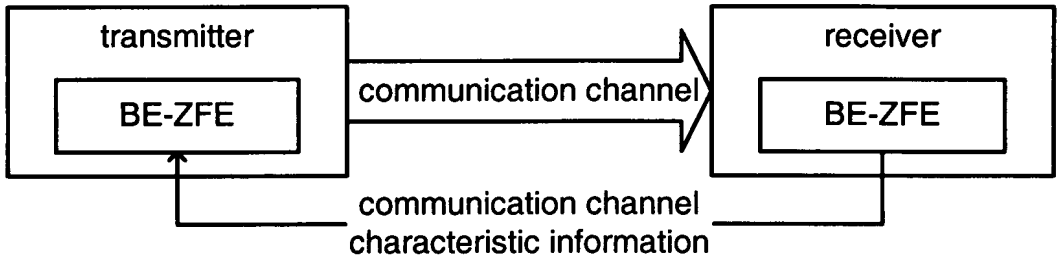
BE-ZFE implemented within transmitter of communication system

Fig. 8A



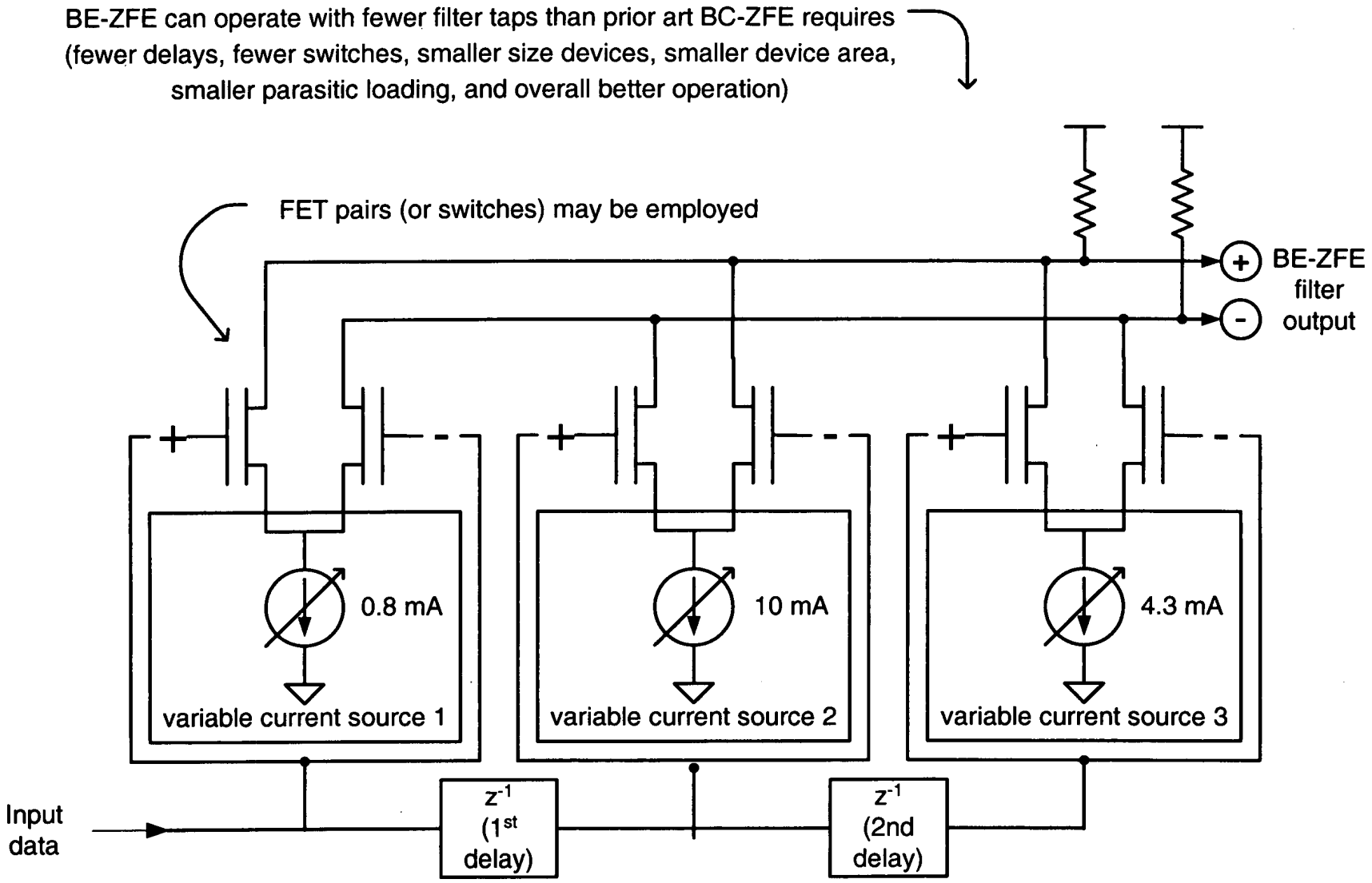
BE-ZFE implemented within receiver of communication system

Fig. 8B



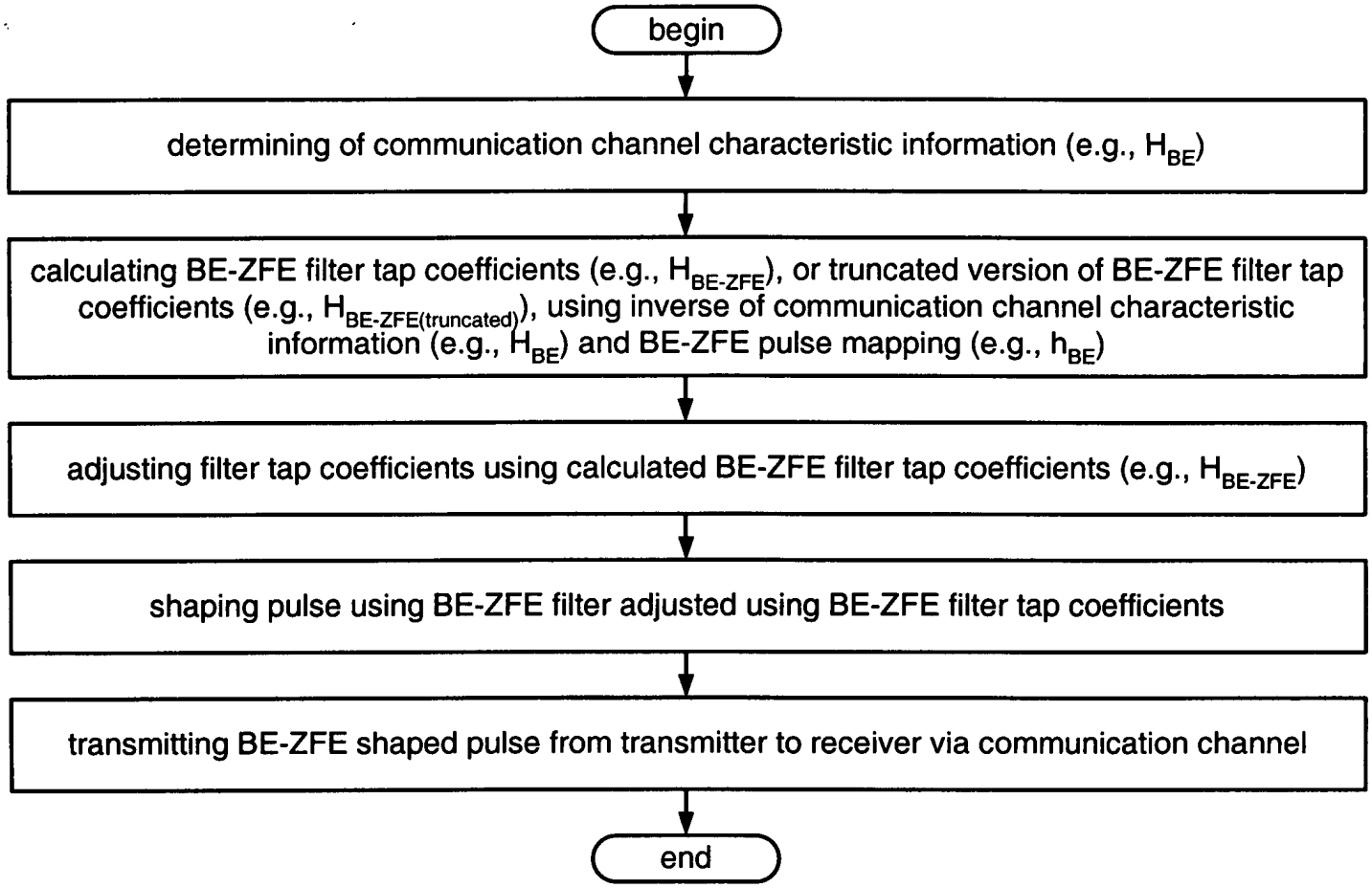
BE-ZFE implemented part in transmitter and part in receiver of communication system

Fig. 8C



3 filter tap embodiment of BE-ZFE

Fig. 9



method for performing equalization on a data signal according to Bit-Edge Zero Forcing Equalization

Fig. 10